JP141 Isolated Multi-Channel Sensing Solution

July 2020



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Isolated Multi-Channel Sensing Solution

Overview

This is a complete reference design for a multi-channel sensing solution for applications such as temperature controllers, data loggers, programmable logic controller (PLC) analog inputs, etc. Isolation between digital and analog components (and among channels) eliminates the noise interference and works to keep the analog to digital converter (ADC) results accurate.

System Benefits

- Complete combination of microcontroller (sensor analog front-end (AFE) and signal conditioning), buck regulator and isolation photocoupler with microcontroller (MCU) reference software
- MCU with AFE for sensing
 - Reduces main MCU workload
 - Flexible communication through 3-wire SPI interface
 - Simple timing design for simultaneous multi-channel sensing
- Photocoupler isolation
 - Long isolation distance
 - No noise emission

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BIG IDEAS FOR EVERY SPACE

Isolated Multi-Channel Sensing Solution





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Device Category	Part Number	Key Features
MCU	RX23E-A	Analog front end mounted 32-bit MCU 32 MHz RX v2 core with 2 low-noise and low-drift 24-bit delta-sigma A/D converters
Power	ISL80410	High voltage adjustable VOUT LDO Low quiescent current and 40V/150mA output
	ISL85415	0.5A regulator with integrated high side FET Supports 3V-36V input voltage range for buck output
Analog	RV1S9260	High-speed CMOS output photocouplers
	PS9124	High CMR 5-Pin SOP photocouplers

JP141



RX23E-A – Analog Front-End Mounted 32-bit MCU

32 MHz RX v2 core with 2 Low-noise and Low-drift 24-bit Delta-sigma A/D Converters

Analog Front-End Features

- Max. operating frequency: 32MHz
- Dual 24-bit delta sigma A/D converters: Up to 23-bit effective resolution, programmable data rate 7.6 sps to 15,625 ksps
- PGA: Rail-to-rail analog input, gain 1 to 128, offset drift 10 nV/°C, gain drift 1 ppm/°C
- Voltage Reference: Low drift 4ppm/°C with good temperature stability
- Excitation Current Source: Matched programmable current source

MCU Functions

- CPU: 32-bit RXv2 (64 DMIPS @ 32 MHz), DSP/FPU for digital signal processing
- Up to 256KB Flash, 32KB RAM, 8KB Data Flash (1M write/erase cycles)
- Interface: SPI x 1 ch, UART x 4 ch, I2C x 1 ch, CAN x 1 ch

Part #	ROM (Kbytes)	RAM (Kbytes)	Temp.(°C)	Package
R5F523E6AxFL	256	32	-40 to 85/105	LFQFP/48/0.50
R5F523E6AxNF	256	32	-40 to 85/105	HWQFN/40/0.50
R5F523E5AxFL	128	16	-40 to 85/105	LFQFP/48/0.50
R5F523E5AxNF	128	16	-40 to 85/105	HWQFN/40/0.50





RTK0ESXB10C00001BJ RX23E-A Evaluation Kits





ISL80410 – High Voltage Adjustable V_{OUT} LDO

Low Quiescent Current and 40V/150mA Output

High Performance and Wide Input Range

- Wide V_{IN} range of 6V to 40V
- Adjustable output voltage from 2.5V to 12V
- Ensured 150mA output current
- ±1% accurate voltage reference (over temperature, load)

High Efficiency

- Ultra low 18µA typical quiescent current
- Low 2µA of typical shutdown current
- Low dropout voltage of 295mV at 150mA
- Low 26µVRMS noise

Excellent Safety

- 40V tolerant logic level (TTL/CMOS) enable input
- 5kV ESD HBM rated
- Thermal shutdown and current limit protection

Part #	V _{IN} Range(V)	V _{out} Range(V)	Enable Pin	Package
ISL80410IBEZ	6 to 40	ADJ	Yes	8 Ld EPSOIC
ISL80410IBEZ-T	6 to 40	ADJ	Yes	8 Ld EPSOIC
ISL80410IBEZ-T7A	6 to 40	ADJ	Yes	8 Ld EPSOIC



Typical Application Circuit



ISL80410EVAL1Z Evaluation Board



ISL85415 – 0.5A Regulator with Integrated High Side FET Supports 3V-36V Input Voltage Range for Buck Output

Wide Working Range

- Power input voltage range from 3V to 36V
- The device provides an easy-to-use high-efficiency, low BOM-count solution for a variety of applications.
- Up to 0.5A load over full temperature range

High Efficiency and Performance (Low Board Space)

- Synchronous operation for high efficiency
- No compensation required
- Integrated High-side and Low-side NMOS devices
- Selectable PFM or forced PWM mode at light loads
- Internal fixed (500kHz) or adjustable switching frequency 300kl g to 2MHz

Part #	V _{IN} Range(V)	Temp.(°C)	Package
ISL85415FRZ	3 to 36	-40 to 125	12 Ld DFN 4x3







FIGURE 1. FRONT OF EVALUATION BOARD ISL85415DEM022



RV1S9160A – High-Speed CMOS Output Photocouplers

High CMR, 15Mbps, Low Forward-Current (IF) 3.3V/5V Operation 5-Pin SOP Photocoupler

High Isolation Voltage and High Speed

- High speed communication (15 Mbps)
- High isolation voltage (BV = 3750 Vr.m.s.)

High Performance with Low Power

- High common mode (dv/dt) tolerant (CM_H , $CM_L = \pm 50 \text{ kV/}\mu \text{s MIN.}$)
- Low input drive current (IFHL = 2.0 mA MAX.)
- Low voltage power supply operation ($V_{DD} = 2.7 V \sim 5.5 V$)
- Low pulse width distortion (PWD = 20 ns MAX.)
- High temperature operation (-40 to +125°C)

Safety Standards

- UL approved: UL1577, Double protection
- CSA approved: CAN/CSA-C22.2 No.62368-1, Basic insulation
- VDE approved: DIN EN 60747-5-5 (Option)

Part #	Temp. Rang(°C)	Safety Standard	Package
RV1S9260ACCSP-10YC#SC0	-40 to +125	UL, CSA	LSSO5
RV1S9260ACCSP-10YV#SC0	-40 to +125	UL, CSA, DIN EN 60747-5-5	LSSO5



WINNING COMBOS

Propagation Delay Time, Pulse Width Distortion vs. Forward Current



PS9124 – High CMR 5-Pin SOP Photocouplers

High speed to 10MBPS with Open Collector Output Type

High Performance and Small Package

- High-speed response (t_{PHL} = 100 ns MAX., t_{PLH} = 100 ns MAX.)
- High-speed (10 Mbps)
- High isolation voltage (BV = 3750 Vr.m.s.), open collector output
- Small package (SO-5)

Safety Standards

- UL approved: UL1577, Single protection
- CSA approved: CAN/CSA-C22.2 No. 62368-1, Basic insulation
- VDE approved: DIN EN 60747-5-5 (Option)

Part #	Forward Current(mA)	Safety Standard	Package
PS9124	25	UL, CSA	SO-5
PS9124-F3	25	UL, CSA	SO-5
PS9124-V	25	UL, CSA, DIN EN 60747-5-5	SO-5
PS9124-V-F3	25	UL, CSA, DIN EN 60747-5-5	SO-5



Maximum Forward Current vs. Ambient Temperature





